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Rocks and Minerals

Vol. 2 MARCH, 1927 No. 1

CONTENTS

Published By

PETER ZODAC

157 WELLS STREET, PEEKSKILL, N. Y., U. S. A.

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ROCKS AND MINERALS

Published quarterly and devoted chiefly to rocks, minerals, ores, crystals, gems, fossils, etc., in the interest of the General Collecting Public.

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Peter Zodac

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EDITORIAL

Rocks and Minerals is being favorably received. Subscriptions are pouring in every day from all parts of the country. Nevertheless, to introduce the magazine still more a vigorous advertising campaign begins with this issue. The general-collecting public as well as students, teachers, schools, boy and girl scouts, etc., not only thruout America but also in many of the foreign countries as well, will be approached. At least 25,000 copies of this issue will be distributed—FREE. It is time the mineral-collecting public had a magazine of their own, a magazine that would be not only interesting and worth-while, but a standard on their particular hobby. We trust each and every subscriber and reader, will "boost" Rocks and Minerals all they can.

It is our desire and policy to improve Rocks and Minerals steadily.

In this issue you will find changes, improvements and additions. Most noticeable, no doubt, is the printing. We decided that the best way to show our subscribers that Rocks and Minerals is their magazine and here to stay is to improve it at the very start. These changes and improvements, we are pleased to say, are due chiefly to suggestions and criticisms, which were sent in, and for which we are grateful.

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Four new features begin in this issue—Beginner's Department—conducted by Mrs. Ilsien Nathalie Gaylord, of Boston (as mentioned in Dec. issue), and a Gem, Prospector's and Archaeology Department—these three being conducted by B. F. Seagle, Jr., of Hickory, N. C. Mr. Seagle is a well-known authority on these subjects, with years of experience in collecting. He is enthusiastic about Rocks and Minerals, and has agreed to assist by taking charge of three departments—The Archaeology department being a sort of a pleasant surprise for the subscribers. We welcome Mrs. Gaylord and Mr. Seagle and are sure subscribers will find their departments interesting and worth-while.

We want to call the attention of readers to "The American Mineralogical Society." We urge each and every reader to join this society and give it their whole-hearted support. It is a worthy cause. The dues are reasonable—only $3 per year, which includes subscription to their monthly publication—"The American Mineralogist." See their ad in this issue.

We are heart and soul in back of each and every mineral society or club, and to encourage such organizations we will be glad to devote a page or more each issue, to their interest, listing each society with officers, dues and other data. All mineral societies, not only in America but thruout the world, are requested to send in their notices, etc., as well as any important announcements. These will be inserted free.

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It would be fitting, proper, and interesting, to run a series of notes or articles on "Famous Mineral Localities of the World." Collectors who are familiar with such localities are requested to send in notes with pictures, if any.

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It is the hope and desire to have Rocks and Minerals appear soon as a monthly, beginning no doubt with the September, 1927 number. Should it do so, subscription price will have to be advanced. Subscribers are urged to take advantage of the low price now prevailing and extend their subscription another year or so. So many subscribers have written in asking us to make Rocks and Minerals a monthly that we will try to do so.

—o—

Our aim is to revive mineral collecting in America. We believe the chances were never better than now. We have received thousands of letters from interested people all over the world, people who can be interested in minerals. So we believe, that the chances are very good, not only for Rocks and Minerals but for dealers as well. You will notice many dealers beginning to use the ad columns this issue, while others are using larger space. We urge each and every subscriber to patronize these dealers as they have some very desirable minerals to offer and please do not forget to mention—Rocks and Minerals.

—o—

Attention is directed to the "Exchange Columns" that appears in this issue. Take advantage of them! Many collectors living near mines, quarries, or other mineral localities can increase their own collection by exchanging their duplicates with collectors elsewhere. We trust these columns may be the means of increasing the collections of each collector listed.

The oldest iron mines in the U. S., at Sterling Lake, Orange County, New York, are now closed, perhaps never to be re-opened again. These mines were in operation during the Revolutionary War, and an old furnace at these mines has the distinction of forging the famous chain that was stretched across the Hudson River to prevent the British ships from sailing up.

A new district for mercury in America, that shows much promise, is that around Morton, Wash., about 61 miles from Tacoma. On Jan. 15th, the district made its 1st shipment of 70 flasks, each containing 75 pounds of mercury, consigned to New York. The mercury in each flask was worth $96.90, or $1.27 per pound, making the value of the entire shipment $6,783. (Eng. and Mining Journal.)

The Agate

A. J. HARSTAD

The experience and correspondence of fifteen years, of interest in gem minerals, has convinced me that the Agate is not only a most popular gem stone but also one of the most desired minerals for the collector's cabinet. This is probably due just as much to the interesting characteristics and beauty of this gem as to its comparative low price and plentiful distribution. As far as I know there has been published only one book on the Agate an old German work entitled "Die Achate." Therefore it will be the purpose of this article to present such facts and theories about this gem, as can be obtained from a fairly extensive library on Gem minerals, together with some original matter on the variety known as Montana Moss or Scenic Agate. As the Agate is a variety of Quartz the purely scientific characteristics will not be considered but its occurrence, distribution and commercial features will be taken up as fully as space permits.

The Agate seldom occurs in veins and is generally found in more or less rounded nodules in sizes from less than one inch to over one foot in diameter. The accepted theory is that they were formed in amygdaloidal cavities in volcanic rocks. These are gas or steam cavities formed in the molten rock befor it solidified and more or less rounded in shape somewhat on the order of the holes in a loaf of bread.

These cavities became filled from the deposition of silica in solution in the waters percolating through the rock. Of course the silica being in solution one flooding of the cavity would not be enough to fill it with silica. The flooding must have been recurrent over a long period of years, each flooding depositing a thin layer of silica on the walls of the cavity and then receding only to have the same process repeated again and again. Each time this happened the cavity of course grew smaller. Naturally there would have to be some provision for the waters to enter and escape. If you will look carefully you will see on some polished agates that the bands toward the center take on a funnel-shaped outline with the opening of the small end at the outside of the agate. This is considered by some authorities to be the avenue by which the solution entered the agate and receded again. Dana considered it more probable that "The silica passed through the outer layers by osmosis, the denser solutions outside supplying the silica as fast as it was deposited within." Others contend that some, if not all, of the agates were formed by the silica remaining in a jelly like state until the whole cavity was filled, and account for the funnel-shaped "Tube of escape" as being due to forces set up by probably crystallization, or change in temperature, or other influences, causing pressure to be exerted and part of the silica being forced through the "skin" or the outer layer of the agate. Any of these theories would seem to be a reasonable account of the form of the agate and its prevailing shape, the cavities generally being rounded and acting as a mould. It is also apparent from these theories that we can consider the Agate as one mineral the outside of which was formed first and the inner part later.

The solutions varied in the amount of silica they carried and moved at different rates of speed. Therefore we have bands of different thickness in the same agate. Also these solutions might have carried organic matter, in addition to the silica, and various oxides may have been present at different times giving us variously colored agates, or single agates, with bands of different colors. These bands as we see them are really groups of microscopic bands, over 17,000 distinct layers having been counted under the microscope in one inch of cross section of an agate.

Conditions varied and changed in the forming of these agates, sometimes changing in one specimen, giving us in some instances agates where part of the bands follow the outline of the cavity while the center layers are parallel horizontally, probably due to some action involving gravity. In other instances, we see agates where the center is filled, or partly filled,

with rock crystal, amethyst or cairngorm. This is due to some change favorable to crystallization taking place while the cavity was filled with silica in solution.

While as a rule the silica adhered to the walls of the cavity in bands of fairly even thickness, it is probable that sometimes the layers were thicker and that gravity overcame the surface tension and the jelly-like silicon sagged. Later despsits would make this sagging more pronounced so we have agates where the bands are in irregularly angular or rounded form and regularly angular form, the latter being called "Fortification Agate." Sometimes, crystals formed near the outer surface of the cavity breaking the rounded outline into angular forms which the later deposits of silica followed. Inclusions of various impurities and coloring matter either at the time of forming of the agate, or later, through cracks which subsequently were sealed with silica, give us the clouded, spotted, and dentritic agates.

The Mother rock in which the Agates were formed, being softer than the Agates, eroded away, freeing the nodules from their matrix making them in most instances easily available along the sea shore or stream banks of the districts where they occur.

The different forms of agate markings have been named as follows:

Ribbon Agate—When layers are nearly straight and parallel.

Eye Agate—Where cross section takes the form of a human eye with large dark spot in center.

Fortification Agate—When bands are broken up into more or less regular zig zag angles.

Brecciated Agate—Fragments of variously colored chalcedony cemented together again by chalcedony.

Mocha, Moss or Scenic Agate—When infiltrations or inclusions of generally manganese oxide take tree moss or landscape forms.

Clouded Agate—Various colors distributed in irregular clouds.

Banded Agate—Where bands follow outline of cavity in which the agate was formed.

The Agate is found in all parts of the World but there are certain localities where it is especially abundant. The Oberstein district in Germany, once a source of a vast supply of Agate, is now worked out but this section is still the center of the Agate cutting industry. Brazil and Uruguay supply a large quantity of this gem today. India, Bohemia, Sicily, Arabia and Scotland have good Agate localities. Several sections of the United States furnish Agates notably Montana, California, Wyoming, Oregon and the Lake Superior district. It is interesting to know that in the matter of beauty of natural coloring and designs the Agates of Western United States are unsurpassed by any in the World. The Agates of the Lake Superior district not only occur in large sizes but also in wonderfully pure colors as red, white, pink, brown, amber, etc. The imitative markings of the Montana Scenic Agate, except, perhaps in a few individual specimens, have no equal in interest or beauty of design among the Agate deposits of the World. The foreign agates are mostly grey in natural color and artificially colored by the Agate workers. Whether or not to include these artificially colored agates in a cabinet, is a matter for the individual collector to decide, but one thing must be considered, do not expect to buy natural colored American Agates, cut by American craftsmen, for anywhere near the price that you can purchase dyed agates, cut by cheaper foreign labor. Most collectors accept the dyed agates for their collections, and personally, I see no real reason why they should not, as they are really beautiful, but I am mentioning this matter simply to eliminate any expectation you might have, of buying the natural American gem, for the same money as the dyed imported one. There is an important difference in cost and value.

The Western Moss or Scenic Agate, while it occurs in Wyoming, Oregon and Colorado, is generally called the Montana Moss Agate because it occurs in this State in greater deposits, over a larger area, and more uniform and better in quality. There are a couple of fairy tales associated with this gem in the public mind and I have had both of them told me in all seriousness, a good many times. One is that these moss and fern like markings are

really bits of vegetation imprisoned in the hardened silica. The other is that the markings are due to the presence of silver bromide or chloride within the agate and the scenic markings really a bit of photography on the part of Nature. A good many, otherwise well posted people believe this latter theory, completely overlooking the absurdity of it. Of course the real truth is far from either of these theories. Careful analysis has established that these markings are due to iron and manganese oxide inclusions assuming these various forms similar to frost forms on the window pane. This fact does not detract from the interesting qualities of this Agate however. It is really more wonderful to think of these markings as being Nature's own artistry.

These Agates are found on the gravel bars close to, and sometimes quite a distance back from, the Yellowstone and Missouri Rivers within the boundaries of this State, the supply diminishing toward the sources of these rivers. The Yellowstone furnishes the most of them. The original source of these agates is unknown as none of them having been found "in place." They are found as broken fragments and rounded nodules from a few ounces up to ten pounds or more in weight. Glendive appears to be the center of the greatest distribution. While they are distributed over a great area the supply is comparatively small. Ranchers, sheep herders and others living in the Agate district gather than, some make agate gathering a regular business. Those on the surface have been practically all picked up and the source of supply is now mainly limited to what the ice gorges disclose when they tear up the gravel beds in the Spring. After the ice gorges go out the early rains wash the mud and sand off the newly uncovered rocks and the agates can be gathered by those who look for them.

Billings, Livingstone, Miles City and Glendive are the agate cutting centers for this State. In these cities the shops display cut gems and polished slabs as high as $100 each, and I have heard of specimens selling for $250. Nice sets for pins and rings, showing moss, fern, and other markings, can be purchased for $1.50 up, the higher priced specimens, being something exceptional in landscape patterns, are generally too large for jewelery. Most of this material is cut in the United States, large quantities being shipped to Seattle, Portland and other coast cities and there polished and mounted for Eastern trade. The quality of the finish given these gems shows the craftsmanship of our American lapidists to the equal of foreign workmen.

The markings vary in number and pattern in the same agate. I have found five pound agates with only one or two markings worth cutting and again smaller stones with a dozen or more good patterns. These markings vary from spots, tree, fern, bird or animal-like forms, to landscape and scenic effects, so natural, that they look like they were painted inside the stone by a real artist. Bands and clouds of milky chalcedony sometimes furnish cloud and water effects and spots of color add to the realistic qualities of some scenes. The colored ribbon and cloudy Agates are also found here and often in the finest of colors. The Scenic agate is really an individual gem. I suppose that those I have handled and seen would run into the thousands and I have never yet seen two with exactly the same markings. G. F. Kunz stated some years ago in reference to these agates that "No stone used in jewelry in the United States is cheaper, more beautiful or more plentiful." There has been such a demand for this gem that good agates now are really scarce and the price is higher, but his statement as to the beauty of this gem still holds good.

The old Hiddenite mines at Hiddenite, N. C., are being re-opened.

The Vehicular Tunnel, connecting New York and Jersey City, is the world's greatest ventilating project. (Mining and Metallurgy.)

The Black Mountain Mica Mine—Maine

By CHARLES F. MARBLE

The so-called mineral belt in Maine, where most of the gem minerals are found, extends in a roughly north-west direction, from below Bath, on the coast, to Stoneham and Rumford not far from the New Hampshire line. But it may fairly be suspected that this does not include everything in that line for there is still some territory not fully prospected.

In the northern portion of this belt, one of the best places for mineral specimens, is the Black Mountain Mica Mine in Rumford. There are two pits about two-thirds of the way up the mountain on its western slope, about a mile from the road between North Rumford and Roxbury Notch. The upper pit is about 200 feet long, 50 feet wide, and in places about 25 feet deep. The lower pit is about 100 feet square and 35 feet deep.

The rock in these pits is very coarse pegmatite with an almost vertical dip. The chief mineral is feldspar and the most common feldspar is the bladed variety of albite-clevelandite.

The next mineral in importance is muscovite which is very abundant. It occurs in many sizes, from small crystals to large books weighing hundreds of pounds, but none will yield any plate mica due to defects caused by ruling, wedge-structure, etc.

Spodumene is plentiful and often occur in large cyrstals up to 3 feet long. It is generally gray in color.

Amblygonite is easy to find and greatly resembles the albite.

Quartz is plentiful and of a very white color.

Pink tourmaline is very plentiful and often occurs in peculiar bunch-like aggregations of crystals that sometimes radiate from a common center, producing beautiful star-shaped specimens, but the gem quality seems to be absent. No pockets are reported. Some of the crystal aggragates are two-colored with a green center—most of the Maine two-colored tourmalines have a pink center. The green center variety is rather rare.

Lepidolite is also found but not in quantity. Two varieties are known—a deep-pink granular variety; and small books, up to 2 inches in diameter, of a pale-violet color.

It has been reported, but as yet not verified by the writer, that small, cinnamon-brown crystals of tourmaline, have been found at or near the contact with the schist, which forms the country rock.

Collectors wishing to visit this mine can always be assured of a bag of fine specimens. There is also the possibility of finding other minerals, particularly some of the rare ones, as small prospects are known in other sections of the same mountain that have yielded beryl (both golden and aquamarine), cassiterite, purpurite, and others. To make quick-time, it is advisable to secure the services of a guide, as the country is somewhat rough and confusing on the first visit.

Notes and News of Minerals of the Rarer Elements

By O. IVAN LEE

Erratum: In "Rocks and Minerals" for December, 1926, Vol. 1, No. 2, p. 25, the statement "The hafnium content of zirconium minerals is roughly proportional to their radio activity," should be amended to read "The hafnium content of zircons (and its alternations)," etc.

EXTRA-TERRESTIAL OCCURRENCE OF THE RARER ELEMENTS

Osbornite, oxysulfide of calcium and titanium, appears to be the only mineral of the rarer elements reported in meteorites, although vanadium occurs in traces in the stone meteorites, titanium is often reported to the

extent of a fraction of one per cent, probably in the pyroxenes, platium, palladium and ruthenium appear in traces, and radium has been found in a single stone meteorite. Since the mean density of the earth indicates that its core has a density of the order of siderites (iron-nickel meteorites), it may reasonably be inferred that the rarer elements are confined almost exclusively to the lithosphere.

A CHRONIC ERROR IS TRACKED DOWN

Two beryllium minerals belonging to different crystal systems but having identical empirical formulae, $2BeO.Na_2O.6SiO_2.H_2O$, have been described. One, called eudidymite, is monoclinic and always occurs twinned. The other, known as epididymite, is orthorhomic. Dana (Sixth Edition) gives the density of the former as 2.553, whereas that of the latter is stated as 3.548. This striking discrepancy seemed inexplicable on any basis of different molecular arrangements in the two minerals, and finally led to the matter being traced to the original paper by G. Flink (Zs. Kr., 23, 353, 1894) where it was found that the specific gravity of eudymite is indeed 2.553, but that **the correct density of epididymite is 2.548.** This error has been perpetuated throughout an unknown number of mineralogies and tabulations, including the International Critical Tablets; and it is hoped that this notice will help to rectify future chronicles.

HERE AND THERE

Sipylite is very near fergusonite in form and may be a variety of it.

Assays reporting platinum in black sands and other suspected ores and residues, should be accepted with reserve and caution, even when made by reputable assayers, and should be checked with the utmost rigidity before any investment or development is made. It has been established that the presence of vanadium in about one part in thirty thousand, which is not at all infrequent, has repeatedly led to the precipitation of ammonium metavanadate (NH_4VO_3) and its reporting as platinum to the extent of about an ounce per ton of the material under examination. The ignited salt is soluble in dilute acids in the case of vanadium, whereas residual platinum is, of course, quite insoluble.

The red color of wulfenite, $PbMoO_4$, characteristic of crystals found at such localities as Phenixville, Pa., and Yuma Co., Arizona, appears to be due to a small percentage of vanadium pentoxide, V_2O_5. In Arizona, this mineral is normally associated with such vanadium minerals as vanadinite, descloizite and cuprodescloizite.

The analysis of arizonite, $Fe_2O_3.3TiO_2$, has been considered questionable.

Bauxite (discredited as a species), both from the southern states and from France, commonly contains from 2.5 to 3.5% of titanium dioxide, ToO_2, probably as inclusions of laths and plates of titanic iron.

Kaersutite is a titaniferous amphibole from Kaersut, Umanaks fiord, North Greenland, occuring in a chrysolitic rock, and contains 6.75% of titanium dioxide.

Xanthitane is a light yellow hydrated and altered titanite, after which it is pseudomorphic, and resembles an aluminous clay in which silicon appears to have been replaced by titanium. It contains 57.5% of TiO_2, and is peculiar to the Jones and Freeman zircon mines near Tuxedo, Henderson County, North Carolina. Inasmuch as it is far more abundant than the zircon which was formerly mined on a tonnage basis, it has been suggested that it might prove a profitable source of titanium dioxide if properly developed. It has also been suggested that xanthitane is related to, if not identical with leucoxene or titanomorphite, a dull white opaque alteration substance not uncommonly occurring with the titanic iron of massive rocks, believed by some to be an altered ilmenite or rutile.

The ash from crude natural petroleums from various parts of the world have been found to carry traces of vanadium.

The mining of patronite, a complex mixture of vanadium sulfides of undetermined composition, and the chief ore of vanadium, is carried on at a higher elevation than any other industrial operation. The mine is situated

at Mina Ragra, Department of Junin, near Cerro de Pasco, Peru, at an altitude of 16,200 feet above sea level, well over three miles.

An exhaustive analysis of zircon from North Carolina has shown the presence of twenty elements, namely, zirconium, silicon, oxygen, potassium, lithium, magnesium, calcium, aluminum, iron, manganese, copper, lead, tin, zinc, uranium, erbium, bismuth, cobalt and helium.

Malacone, named from the Greek **malacos,** soft, since it is softer than the anhydrous zircon of which it is a hydrated pseudomorph, is stated to be one of the few minerals known to contain the rare gas argon. The idealized mineral approximates to the formula Zr3 (SiO4)3.H2O.

The Sluice Box

By A. RIFFLE

Mr. Zodac has requested that "The Sluice Box be continued in future issues of "Rocks and Minerals" and an effort will be made to do so. It will be continued as a column devoted to more or less pertinent observations and news and odd bits of information relative to the collecting of minerals. If any of you "Clean up" an occasional "Nugget" of information or a few "Colors" of humor from the "Gravel" that will go over the "Riffles" of this "Sluice Box" the writer will consider himself amply repaid for his efforts. The column will be a contribution entirely and not editorial in any sense.

The December number of "Rocks and Minerals" gives us every reason to expect that the mineral collecting fraternity will soon have magazine representation equal to, or better than, that of any other hobby.

Bulletin 119 "Handbook of Gems in U. S. National Museum," is a 225 page book that is not only a catalog of the gems in the National Museum but is also a well illustrated textbook on gem minerals, containing some good information along mineralogical, mythological and commercial lines, including a good bibliography. As far as the writer knows this is still available from Supt. of Documents, Washington, D. C., for the nominal sum of 50 cents. Remit coin or Post Money order.

Blessed indeed is the mineral collector whose wife shares his enthusiasm for his hobby.

"Old Bill" is one of the few survivors of the early day prospectors of the Rockies. When he and his few still living contemporaries pass away the West will have lost the noblest and most picturequse type of manhood that it has produced. As a class they may have been deficient in the social graces, true also that many of them had but elementary knowledge of the Science of mineralogy, and most of them failed of any striking financial success, but no oath bound, virtue dedicated organization in History ever excelled these Knights of the Pick and Shovel and Pan in Honesty, Determination and Courage. When "Old Bill' and his associates make their last "locations" on a "claim" four by six feet, we, who had the good fortune to know them will mourn, not only the individuals, but also the type for changed conditions make it improbable that we shall ever see their equals again.

The dealers profit on a specimen probably does not equal one-half the amount you would be out in time, money and effort, trying to procure the same specimen from first source.

Dig out and dust off those duplicates and the books and instruments you no longer care to keep. There is a market for them through the classified ads in "Rocks and Minerals."

"Old Bill" is well read but sometimes he gets his authorities mixed up. Here is one he pulled on me the other day. We were discussing a certain legislative body and he said, "Why they are worse than those Forty Thieves that Scripture speaks about."

The gold fever affects some men in the most absurd and unaccountable fashion. Some of them see gold in every rock and dig for it in the most unlikely of places. This observation was brought about by an incident last week when I was in the mountains looking for specimens. I came upon a small abandoned shaft in a most unlikely location. Upon my return I questioned "Old Bill" as to it's history and this is what he told me. One of the numerous "pseudo" prospectors had been on a trip through the mountains and killed a grouse at this spot. When he cleaned the grouse he found a pea size nugget in its crop. This man went back to the spot where he shot the grouse and without other indication to guide him, dug a fifteen foot shaft, before it dawned on him that the grouse might have picked up the nugget across the river or over in the next county.

In supporting "Rocks and Minerals" whether with subscriptions, advertisements or articles, you are doing a bigger favor for yourself than for anyone else. A moments reflection will convince any of us that with an equal expenditure of time money and effort, Mr. Zodac could make more money in almost any other endeavor than he can with "Rocks and Minerals."

Don't belittle a specimen because it is of common substance. Remember what Kipling says "For Iron, grey Iron, is Master of them All."

Arabian Nights may appeal to some people but for real entertainment give me "Montana Nights" in an old prospectors cabin, with its low ceiling, log walls, and snapping wood fire. The ceiling papered with red rosin paper, frescoed with water stains from a leaking roof in fantastic groupings of mountains, forests, and valleys, and grotesque images of men and beasts. The rough pine floor with the inimatable patina that comes to such wood only after years of wood ashes, bacon grease, and tobacco juice. The rough bunk, the rusty stove, and the window sills full of specimens. The mingled odors of burned biscuits, wet boots, and powder gas, together with that unmistakeable perfume that betrays a recent invasion by the clown of the mountains, the pack rat. Then with a grizzled, gray bearded veteran of the hammer and drill, to tell again those never palling stories of lost mines, chance discoveries, and marvellous assays, I'll gladly leave the entertainment of Oriental setting to some one else.

"Old Bill" says the next stampede he'll join will be "Over the Divide to the Camp where the Streets are paved with Gold."

If your State has a School of Mines do not overlook the value of this institution to you. As far as the writer knows all of them will classify specimens from mineral finds, for citizens of their state, free of charge. Probably none of them will give a commercial assay but if you consider the presence of a certain mineral to be probable they will determine this for you. Always include a sizeable specimen for their collection in case it should prove desirable.

You can do some missionary work for our hobby by explaining to any one who shows signs of interest that one does not need to be a scientist to enjoy mineral collecting.

The Geology of the District of Columbia

PART 2

By Mr. ELRA C. PALMER, of Washington, D. C.

In the last paragraph of my introductory statement in the December issue of "Rocks and Minerals," I spoke of the crystalline rocks of the Piedmont plateau as underlying the District. I mentioned, also, the leading rock types of this rocky floor. Quarrying and excavating have disclosed that the granite and quartz of this floor have been heaved up by tremendous chemical and caloric forces which broke up the great body of rock, so that where it is exposed by quarries on the Potomac shore southwest of the City, and on Connecticut avenue, and in the gorge of Rock Creek Park, the lines of cleavage average about two feet apart and form planes of separation which have a tilt of only about twenty degrees from the perpendicular, leaning toward the northeast.

The Piedmont (foot of the mountain) plateau, as American geologists know, is the high surface extending eastward from the bases of the easternmost ranges of the Appalachian mountain system for practically its whole length, and having a gradually lowering altitude toward the ocean until it merges into the Atlantic Coast Plain under whose overlying deposits, made during at least seven or eight successive submergences and uplifts covering a tremendous period of time, the crystalline rocks of the plateau extend for many miles. There is evidence showing that all of the District was under water and that the shore of the sea was far west along the base of either the Blue Ridge or the Catoctin range, during at least one of these periods of submergence. The Potomac river could not have been flowing then in its present bed and the rugged and beautiful gorge known as "The Palisades of the Potomac" which now skirts the southwestern edge of the District had not then been worn down to its present depth through the solid granite which now forms its walls. The **Otodus** may have then fished for and eaten the large and luscious **Brachiopods** under water on the spot where the capitol of the nation now stands.

When the District was under water the first time, probably for many thousand years in the early Cretaceous period, clays and sands, made from and mixed with broken pieces of granite and quartz of various sizes, were deposited on the rocky floor of the submerged Piedmont plateau; and when the mighty internal forces lifted this floor high above water, this deposit was fully 650 feet thick in some places. We call this deposit the Potomac formation. Its clays are of many beautiful colors, such as pink, red, gray, yellow and even white, found in layers and also bunches. These colors undoubtedly came from impregnations of the many minerals scattered on the surface of the earth at that early period of its formation in much greater abundance than now. In these layers are found many lenses or chunks of iron ore which, fusing with the sand, made ferruginous sand nodules, many of which are quite beautiful and interesting to the mineral collector. The writer has gathered many pounds of them and Mr. Zodac will soon be supplied with a quantity of them which he will be able to furnish to collectors over the world.

A long period of erosion or planing off of the surface evidently took place before this area again took a dive below the troubled surface of the sea to emerge again after a long time with an additional load of deposits on its back. This load consisted of dark carbonaceous sands which, in certain places, are still nearly thirty feet thick in Maryland southeast of the District, and which contains many mollusk fossil shells and imprint of shells. This load of deposits is called the Matawan formation.

Again the crust rested for a long while and took on a coat of brown sand on top of the rest, which has been found to be twenty-five feet thick about ten miles northeast of the District. The time when all this came above water is assigned to the later Cretaceous period. The next dip under water taken

by this uneasy part of the earth's crust occurred in the early Eocene period, and the beds of material deposited this time consisted of blue-black marl beds made up of organic matter (which may have been from vegetation that grew on the preceding formation), several species of mollusk remains of which the writer has found several "petrified" specimens as well as clay imprints of shells which have turned to "stone." The beds also contain glauconite, clay, carbonate of lime and red sandy soil.

Finally all this was hoisted out of the water, and constitutes what is called the Pamunkey formation.

Again came a long period of subsidence and uplift covering a large area and reaching many miles inland west of the District. This must have been a long and deep subsidence, for the deposits consist of fine sand and chalky clay containing diatomaceous remains and having a thickness of fully eighty feet. These deposits are called the Chesapeake formation and were laid down in the Miocene period.

Centuries later another subsidence and uplift occurred covering not only the District but a large area of Maryland and Virginia also. The sedimentary deposit in this case is known as the Lafayette formation. The deposits of this formation may be easily examined on the hills in and east of the U. S. Soldier's Home, on the hills west of Alexandria, Va., and in the western and northern parts of the District. The age when this action took place has been determined as the Pliocene period.

These various movements of the earth's crust are wonderful to contemplate and we are struck with awe as we think of the tremendously powerful forces that operated to cause these changes. That such changes were actually made can be as accurately determined by the trained geologist as the length of a stick can be determined by a carpenter. The Columbia formation, which was made later, is so interesting in the variety of its deposits that I wish to tell you about them and my own "finds" of certain minerals and fossils, in the District of Columbia and nearby parts of Maryland. Therefore, the next article will close this necessarily brief story of prehistoric times as revealed by the rocks and minerals and soils in and around the District of Columbia.

(To be continued)

Identification of Minerals

Free use has been made of standard books on Minerology as Dana's, Butler's, Brush-Penfield's, etc.

Before we go any further with our studies on "Identification of Minerals" we must first take up a little chemistry as the rest of the lessons depend so much on this important subject that every collector should have some knowledge of it, in order to understand the lessons, easily, thoroly, and correctly.

PART 3

FIRST PRINCIPLES OF CHEMISTRY

What is chemistry? Chemistry may be defined as a science that deals with **substances and the changes they undergo.**

What is a substance? A substance can be most anything that exists and possesses weight. Some examples are iron, tin, pebble, mineral, glass, paper, cloth, wood, liquid, gas, air, etc. Such things as sound, thought, light, electricity, heat, cold, etc., are not substances but are results produced by substances in action. We recognize or tell one substance from another by their characteristics, or qualities, generally called **properties.** Thus, iron is heavier than aluminum, diamond is harder than talc, coal is black, sugar is sweet, vinegar is sour, etc. These are only some of the properties possessed by substances. Other properties are color, taste, feel, odor, weight, appear-

ance, melting temperature, boiling temperature, ability or inability to dissolve, burn, etc.

Changes in Substances.—Substances can undergo two changes—a temporary change known as **physical Change,** and a permanent change known as **chemical change.** In a physical change the change that takes place is only for a short time and leaves the substance when the cause that made the change is removed—and the substance regains its former state. Thus, ice or steam resulting from water changes back into water when the cold or heat is removed. A knife can be magnetized and thus made to pick up smaller pieces of iron or steel but regains its original state when the magnetism is removed. Many metals can be heated very hot but on cooling retains their original state. These are only a few examples. In a chemical change the change once made remains so and the substance never regains its original state. Thus, wood, paper, coal, etc., once burned up never regain their original state when the heat is removed. Extraction of metals from their ores, cooking of foods, etc., are other chemical changes. Such changes as breaking of glass, tearing of paper, etc., are simple changes of appearance in a substance.

Physical and Chemical Properties.—As we divided **changes** into physical and chemical changes, in like manner we divide the **properties** of substances as either **physical** or **chemical properties.** Those properties are **physical** that can be determined without a **chemical change** as taste, odor feel, weight, etc., while **chemical** properties can be shown only by a **chemical change.** When a substance is described in chemistry, its most important physical as well as chemical properties are given.

Reagents and Reactions.—Substances which have a chemical effect upon one another are said to **react,** and a chemical change is therefore called a **reaction.** The substances which react are called **reagents.** The new substances formed are the **products.** Thus, when copper is treated with concentrated nitric acid a **chemical reaction** takes place, and the copper and nitric acid are the **reagents.** The brown gas formed is one of several **products.** The term "reagent" is frequently applied to substances used in the laboratory for producing changes in other substances.

Elements and Compounds.—Almost all substances known in this world can be shown to consist of two or more substances, in combination, and are therefore called, **compound substances,** or **compounds.** When a substance can be shown to consist of only **ONE** substance, such a substance is known as an **element.** So far, there are known to the world about **ninety** different elements and these unite with one another to form thousands of compounds. Man, animals, insects, fishes, plants, rocks, water, air, in fact anything imaginable that exists in this world, is made up of these few elements. A few of the elements can be found **free** or **pure** in nature, but the majority are found only in combination with other elements. The **free** elements are known to the mineralogist and geologist as **native elements.** Some examples are gold, silver, copper, arsenic, sulphur, carbon (diamond and graphite), bismuth, mercury, etc. There are two classes of elements—**metals** and **non-metals.** Metals are heavy with a pecuiar luster, they are malleable, ductile, etc., while the non-metals lack these properties. All metals are solids under ordinary conditions, except mercury, which is a liquid. Some of the non-metals are solids, like sulphur and phosphorus; or gaseous like hydrogen and oxygen. Bromine is a liquid. These properties are all physical but the chemical are also very important.

Symbols.—For convenience, elements are designated by symbols, usually the first letter of their names, or this with another letter. A few **elements** like gold, silver, copper, lead, etc., take their symbols from their latin names as Au for Aurum (Gold), Ag for Argentum (Silver), Cu for Cuprum (Copper), Pb for Plumbum (Lead), etc.

Chemical Affinity.—Elements have a strong tendency to unite with one another. This property is known as **chemical affinity.** It is usually strongest between metallic and non-metallic elements, as sodium and chlorine to form sodium chloride, or between iron and sulphur to form iron sulphide, etc.

Atoms and Molecules.—The Chemist, as well as other scientists, have often

to deal with very minute substances, or parts of substances, in order to establish some theory or law. Thus, we have the **atom**, and it is defined as the smallest particle of an element that can **exist** to enter into combination with a particle of another element. Molecules are defined as the smallest particle of a compound that can exist. Atoms are smaller than molecules but the molecules, themselves, are very, very small, so small in fact, that in **one drop of water millions** of molecules may be present.

Atomic Weight.—Altho the atoms are so very small, nevertheless, they possess some weight and the weight of each atom of the same element is the same, but the elements, themselves, differ in weight from one another. The weight of an element is a very important physical property and in order to establish some scale of comparison, one of the elements is taken as a standard, as hydrogen or oxygen. Hydrogen, a gas, is the lightest element known and when it is taken as a standard, its weight is given at 1. Oxygen, also a gas, is about 16 times heavier than hydrogen, so when it is taken as a standard, its weight is given as **16. Atomic weight**, therefore, is the weight of an atom of an element as compared with that of an atom of hydrogen or oxygen.

The following table gives the most important elements, with smybols and atomic weights.

TABLE OF ATOMIC WEIGHTS

	Sym.	H=1	O=16
Aluminum	Al	26.9	27.1
Antimony (Stibium)	Sb	119.2	120.2
Argon	A	39.6	39.88
Arsenic	As	74.37	74.96
Barium	Ba	136.3	137.37
*Beryllium	Be	9.0	9.1
Bismuth	Bi	206.5	208.0
Boron	B	10.9	11.0
Bromine	Br	79.35	79.92
Cadmiun	Cd	111.55	112.4
Caesium	Cs	131.8	132.81
Calcium	Ca	39.8	40.07
Carbon	C	11.9	12.0
Cerium	Ce	139.1	140.25
Chlorine	Cl	35.18	35.46
Chromium	Cr	51.6	52.0
Cobalt	Co	58.53	58.97
Columbium	Cb	92.8	93.5
Copper (Cuprum	Cu	63.08	63.57
Dysprosium	Dy	161.2	162.5
Erbium	Er	166.4	167.7
Europium	Eu	151.	152.0
Fluorine	Fl	18.9	10.0
Gadolinium	Gd	156 5	157.3
Gallium	Ga	69.5	69.9
Germanium	Ge	71.9	72.5
*Glucinum	Gl	9.0	9.1
Gold (Aurum)	Au	195.7	197.2
Helium	He	3.96	3.99
Holmium	Ho	162.2	163.5
Hydrogen	H	1.00	1.008
Indium	In	113.9	114.8
Iodine	I	125.9	126.92
Iridium	Ir	191.7	193.1
Iron (Ferrum)	Fe	55.4	55.84
Krypton	Kr	82.18	82.92
Lanthanum	La	137.9	139.0
Lead (Plumbum)	Pb	205.5	207.1
Lithium	Li	6.88	6.94
Lutecium	Lu	172.6	174.0
Magnesium	Mg	24.1	24.32
Manganese	Mn	54.5	54.93
Mercury (Hydrargyrum)	Hg	199.0	200.6
Molybdenum	Mo	95.3	96.0
Neodymium	Nd	143.1	144.3
Neon	Ne	20.0	20.2
Nickel	Ni	58.23	58.68
Niton (Radium emanation)	Nt	220.6	222.4
Nitrogen	N	13.9	14.01
Osmium	Os	189.7	190.9
Oxygen	O	15.88	16.00
Palladium	Pd	105.9	106.7
Phosphorus	P	30.78	31.04
Platinum	Pt	193.6	195.2
Potassium (Kalium)	K	38.82	39.1
Praseodymium	Pr	139.5	140.6
Radium	Ra	224.6	226.4
Rhodium	Rh	102.1	102.9
Rubidium	Rb	84.79	85.45
Ruthenium	Ru	100.9	101.7
Samarium	Sm	149.3	150.4
Scandium	Sc	43.8	44.1
Selenium	Se	78.6	79.2
Silicon	Si	28.1	28.3
Silver (Argentum)	Ag	107.03	107.88
Sodium (Natrium)	Na	22.81	23.0
Strontium	Sr	86.95	87.63
Sulphur	S	31.83	32.07
Tantalum	Ta	180.0	181.5
Tellurium	Te	126.5	127.5
Terbium	Tr	157.9	159.2
Thallium	Tl	202.4	204.0
Thorium	Th	230.6	232.4
Thulium	Tm	167.2	168.5
Tin (Stannum)	Sn	118.1	119.0
Titanium	Ti	47.7	48.1
Tungsten (Wolframium)	W	182.6	184.
Uranium	U	237.6	238.5
Vanadium	V	50.6	51.0
Xenon	Xe	129.2	130.2
Ytterbium	Yb	170.6	172.0
Yttrium	Y	88.3	89.0
Zinc	Zn	64.87	65.37
Zirconium	Zr	89.9	90.6

*Beryllium is sometimes called Glucinum.

Dorothy's Great Idea

By PEARL HAMILTON ELLIOTT

Scene 1

Mr. Slamm was a mineral bug, and all his spare time was devoted to his collection, much to his wife's disgust. One day he brought home an extra nice specimen, full of color and very expensive. For once to Mr. Slamm's pleasure his better half was interested in that specimen.

Said she, "Henry, where in the world did you get it? Such beauty, and only one."

Mr. Slamm was surprised. "But my dear, you always protest my hobby, and I didn't dare buy more, altho the dealer had thirty such specimens, but you've always been so impossible."

Mrs. Slamm's eyes glistened. "Henry, did you say thirty? Well if you go down there right now, and buy those remaining twenty nine I heartily forgive your hobby."

Exit Mr. Slamm.

Scene 2

Puff, puff, "Gosh, what a load, hey, Dorothy, come here, will you?"

"Coming Henry, coming, gracious, back so soon? What a darling you are."

Mr. Slamm beamed all over, hardly able to stand such pressure, altho he was rather puzzled over his wife's sudden change.

"Sure nice to have Dorothy so congenial on my hobby" he thought, "But what in hecks happened?"

Mr. Slamm unpacked the specimens admidst the ohs and ahs of the delighted Dorothy. "Now," he said, after the papers and cotton had been cleared away, "I must label and number these specimens, so hand over that record book, yes, that one on the mantel."

To Mr. Slamm's surprise Dorothy protested.

"Now Henry, do let me fix up the record for you. It'll be so interesting, and I should learn just how to do it."

Poor Mr. Slamm scratched his head as he handed over the record.

"These females, who can understand them? Is she trying to pull my leg? No, she's had her allowance. Birthday? Of course not, she never has any. Then what the heck is it? Anniversary? No, not that." Marriage had numbed Mr. Slamm to such an extent that he had lost track of time. "Oh, well, I'll give it up."

Exit Mr. and Mrs. Slamm. (Bedtime snories).

Scene 3

Suddenly a knock was heard, a loud one, Dorothy went to the door. "Henry, oh Henry, you must leave for New Haven immediately."

"Alright, was that telegram for me?"

"Certainly dear, but I was afraid it might be a death announcement, and you know your heart is rather lopsided. It might have been your Mother. The good Lord sometimes takes, you know."

"Good," Mr. Slamm glanced rather suspiciously at Dorothy, and then exploded. "Woman, are you insinuating something?"

"You big silly," Dorothy smiled sweetly, "Now you must hurry, and don't worry about the specimens, I'll attend to them."

"Alright, be sure to use those little stickers for the numbering. I'll return Monday, then we'll buy a new cabinet."

Exit Mr. Slamm.

Scene 4

What a lovely morning, birds, flowers, and Dorothy gloriously happy. Her head was full, in fact, over flowing with a wonderful idea, a great one. "Now let me see," she murmured, "thirty specimens, fifteen for each pillar, fine, just won't the neighbors be jealous, just won't they?" and with a gurgle of glee Dorothy flew to the 'phone.

Knock, no telegram this time, but masons thoroly armed with tools.
"Mrs. Slamm?"
"Yes" announced Dorothy briskly, "Please step in and Ill give you instructions, now, you see those large colored rocks? I want them studded in the two pillars which support the veranda roof, and the work must be done today, now, remember, fifteen in each pillar."
So the merry work commenced while Dorothy gleefully considered and reconsidered the jolt the neighbors would receive. Such art, such originality, why perhaps the very elite of the town would be only too glad to call socially.
"Well, we're thru," announced the masons as Dorothy came to the door.
"Wonderful," exclaimed Dorothy as she stepped to the walk for a better view. "But are you sure they won't come out?"
"Come out, heavens no, why to get 'em out is impossible, unless the pillars are removed, and when that happens the veranda roof will collopse."
"Alright," said Dorothy, "I'm glad to hear they're so secure, now, when Mr. Slamm returns, he'll pay you."

Scene 5

At last Monday rolls around and Mr. Slamm has not returned, lunch time, and still Dorothy is alone. "What in the world is keeping him?" she murmured as she fretted over her salad. "Well, if he returns during the night I won't mention the pillars for he must see them in the sunlight."
Finally night shed it's darkness over the land, and Dorothy tired, climbed into bed earlier than usual. Around midnight a grating noise awakened her. It was Mr. Slamm.
"Oh, Henry, I thought you'd never return."
"Couldn't help it dear, I missed the train, confound it, something like that always happens to me. How about those new specimens? Did you put them in a dry place?"
"Er-er, yes, I guess so, of course," stammered Dorothy as she pulled the covers closer around her. "But do retire Henry, it's late and I have a surprise for you in the morning."
"Surprise, for me," exclaimed Mr. Slamm, "You little rascal, I'll bet you bought that new cabinet during my absence."
Finally quiet reigned and just before dawn, a sound, oddly strange awoke our friends.
"Henry, did you hear that?"
"Yes, sounds like burglars, where's the gun?"
"Here, under the pillow, what can they be after?" whispered Dorothy.
"Those specimens of course, they cost several hundred, and I remember now, someone did follow me home, perhaps he, ye Gods! hear that?" groaned Mr. Slamm.
Creak, Creak, and then CRASH!!!
"Oh, oh, is the house coming down?" wailed Dorothy.
"Sounds like it," whispered Mr. Slamm, "Stay where you are, and I'll investigate," and tiptoeing from the room he made for the stairway, but as fate would have it, he stumbled and went feet over pigs ears, and landed with a grand bang in the dining room.
"Henry, hold him, hold him," cried Dorothy, as the racket reached her.
"Hold him, heck, turn on the lights," roared Mr. Slamm.
"Why, Henry, I thought you collared the burglar."
Mr. Slamm didn't answer, but allowed Dorothy to assist him to his feet.

Scene 6

Lights burning full blast but no robbers to be found. Rather bewildered Mr. Slamm went to the front door and peered out.
"Ye Gods! Dorothy; the veranda roof has collasped, and say, the supports are gone"!!!!
"Henry, are the pillars really gone?"
"Yes."
"Oh, oh, I wish they'd kill me," sobbed Dorothy.

"There, dear, nothing to cry about, we're not hurt, and the minerals are safe," comforted Mr. Slamm.

"No. they're not."

"What?"

"The specimens were in those pillars."

"Dorothy, have you been in my cellar?" demanded Mr. Slaam.

"No."

"Then what's the matter with you?"

"Well, you see, I thought those specimens would look nice studded in the pillars, so I had two men put them in for me, and now those pretty things are gone."

Poor Mr. Slamm sank into the chair with a groan, wondering in a dim sort of way why certain laws were made and enforced. "Let me see," he murmured, "The Lord made the world in six days and then He made man, on the Seventh day He rested, after that came woman, and neither God nor man has rested since."

(Finis)

Paleontology Department

Conducted by
BENJAMIN T. DIAMOND, B. S.

Mr. Diamond will gladly assist subscribers in identifying their fossil specimens or answering any questions pertaining to fossils. Please write to him direct, enclosing enough postage if a personal reply is desired, specimens returned, etc. Address all mail as follows: Benjamin T. Diamond, B. S., 467 Riverdale Ave., Brooklyn, N. Y.

DIRECTIONS FOR COLLECTING FOSSILS

There are no definite laws I can lay down which will govern the formation of a collection of fossils. Collections are individual. Every person has his own way of working out the details. I shall bring before the readers some methods and hints which may be of assistance to them.

Where Fossils Are Found

Fossils are never found in rocks which were originally molten. Sedimentary or stratified rocks usually contain evidence of life. Limestones, calcareous shales, and clays are often fossiliferous. Gneisses, Schists, and other metamorphic rocks can hardly be expected to yield fossils, since rocks have undergone alterations which have involved enormous pressure and heat. In the process of metamorphism, fossil remains would have been destroyed. Actual experience in the field will teach the collector just where fossils may be found and where not.

Limestone or ironstone nodules—Nodules of limestone or ironstone often have very fine fossils in the center. These should be broken and examined, but sometimes it is not easy to split them so as to expose the fossil. If the nodules promise well, a quantity of them should be collected and treated in the laboratory by putting the nodules into a fire and dropping them, when quite hot, into cold water.

COLLECTING OUTFIT

1. **Collecting Bags.**—A strong durable canvas bag or an Army knapsack will serve the purpose for a collecting bag. If the collector desires a more expensive one, a regulation leather bag which is used by Geologists and Paleontologists may be obtained from a Geological supply store.

2. **Hammers.**—Two hammers are necessary, one for collecting fossils and for prying up thin ledges of rock (see fig. 1), and the other for trimming specimens (see fig. 2). In trimming a specimen direct blows near the margin of the specimen and never near the center.

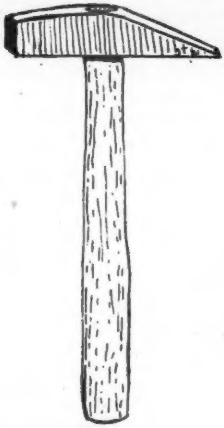


FIG. 1.

FIG. 2.

3. **Chisel.**—A small chisel comes in handy in freeing fossils from large blocks of rock or from the face of a cliff.

4. **Lens.**—A magnifying glass is necessary to help in identifying specimens. In field work a cheap lens may be used while for home study a more expensive glass would serve the purpose better.

5. **Notebook**—A small book in which sketches and notes are to be entered. Sketches of either the fossil or of the territory may be entered for future reference.

6. **Field Label.**—The locality of the specimen must be recorded or the specimen loses its value. The best type of label is the one used by the United States Museum.

FIELD LABEL

Number: ____________________

Date ________________________________

Page Number: ____________________

Locality: ____

Remarks: ____

Collector: ____

Field Label Used By American Natural Museum.

7. **Wrapping Paper.**—Newspapers should be taken along in order to wrap the specimen.

Hints—The first important principle for a collector is to gather large collections from localities in which he is collecting. Don't stop at two or three specimens of a common species when there are hundreds about you. The duplicates will aid you in studying the local variation of species and are also useful in making exchanges.

The second important principle in collecting fossils is to determine accurately the geographic position of the locality and the horizon from which the fossils have been taken. This should be entered into the notebook and will help you in identifying an index fossil.

Index Fossil

Any fossil which is abundant in a thin layer of rock extending over a

great area is known as an index fossil and becomes an important geologic time or horizon marker. The Trilobites are a basis for the subdivision of the Cambrian.

Division of Cambrian	Species of Trilobites	
3. Upper Cambrian	Dikellocephalus Fauna	As Index Fossils
2. Middle Cambrian	Paradoxides Fauna	
1. Lower Cambrian	Olenellus Fauna	

If a Dikellocephalus pepinensis is found, it immediately tells us that we are in the Upper Cambrian. This shows the importance of recording the locality.

Avoid hasty collecting. If you have the time, it is far better to make one large and well gather collection than two or three small ones.

When fossils are found free, lying in the soil, it always pays to get down on the hands and knees and crawl over the ground in search of them, rejecting only poorly preserved or badly broken specimens. In doing so, the smaller specimens are more likely to be seen, and at the same time collections will not be made hastily. Picking of this kind affords much pleasure and involves less labor than collecting from limestones or sandstones. Wrap each specimen separately in paper, preferably in old newspaper, or if delicate, in cotton or tissue paper.

Remain in a fossil territory until all good material has been picked up.

Cleaning and Trimming

The trimming and cleaning of fossils is entirely mechanical and the degree of success will depend largely upon the amount of patience and originality possessed by the collector.

Preliminary Record

After the fossils have been trimmed and cleaned, the preliminary recording should be taken up, since the fossils are as yet unstudied and unassorted, and may remain in this condition for a long time, during which it may happen that the field label containing the most important information is lost. To guard against such accidents, attach a number to the fossil with some glue and enter the locality, the formation, the date, when collected, and the name of the collector in your notebook opposite the number which you put on the specimen. When the collections have been studied and determined, a permanent record is to be made.

(Next Issue—The Catskills as a Fossil Field)

The 135th meeting of The American Institute of Mining and Metallurgical Engineers was held at the Institute headquarters, 29 West 39th St., New York, Feb. 14-17th. An interesting program was arranged, covering a period of 4 days, instead of the usual 3, as hitherfore.

Aside from the technical sessions, the program was so arranged as to allow visitors an opportunity to inspect some of the Engineering Marvels or other interesting features, in and around New York City. Dinners, teas, theater parties, shopping and sight-seeing excursions were also arranged, especially for the women.

The Smoker, which is always popular, was held in the Banquet Hall of Mecca Temple, 133 W. 55th St., at 8 P. M., Mon. Feb. 14th.

The Annual Business Meeting was held at the Institute's Auditorium, Tues. Feb. 15th, at 10 A. M.

The Annual Reception, Banquet, and Dance was held at the Waldorf-Astoria, Wed. Feb. 16th, at 7 P. M.

A full report of the meeting, with business transacted, will appear in an early edition of "Mining and Metallurgy."

Mr. W. H. Staver, Mining Engineer, of New York City, recently was out West on business. While in Colorado he thoughtfully remembered the Editor with a letter, sent—via Air-Mail.

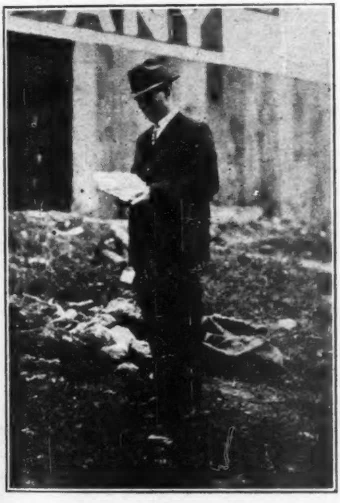
Home of the World's Largest Deposit of Cyanite

By B. F. SEAGLE, Jr.

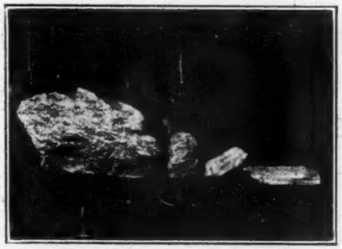
Mountain of rare mineral lies locked in a hillside in heart of Appalachians. Ten million tons of it in plain sight, with an estimated hundred million tons in the vein. Stuff is used in the manufacture of spark plugs and in the ceramic industry. This is the first time in history of world that this valuable mineral has been found in tonnage. This new discovery of the world's largest deposit of cyanite is a large addition to the mineral wealth of the world.

Right in the heart of North Carolina's towering mountains and in the very shadow of Mount Mitchell, the highest peak east of the Rocky Mountains, and two miles from Burnsville, county seat of Yancy county, there lies in fabulous volume the rare mineral—cyanite, a substance that men have sought in the far corners of the globe without success.

Experts estimate that there are a hundred million tons of cyanite in one



J. A. Pollard, discoverer of the cyanite mountain, examining a specimen of it. To the right and at his feet are other specimens, all running between 35 to 40 per cent pure cyanite.



This picture shows several specimens of cyanite rock. No. 1, cyanite found in tonnage, running 35 to 40 per cent pure mineral. No. 2, also found in tonnage, but running 60 per cent pure. No. 3 and 4, specimens found in other parts of North Carolina and the world over, but only in small quantities, and found on top of the ground only (no tonnage), but running 95 per cent pure cyanite.

mountain where the initial deposit was discovered. Upon a single area of the mountain, a spot of ground a quarter of a mile wide and three quarters of a mile long, there is visible about ten million tons in the rock upon the surface of the earth.

Jasper Stuckey, state geologist, after personal inspection of this invaluable find, and an accurate tracing of the main vein of the mineral, which he could hardly believe existed after he had seen it, gives the Yancy county deposit of cyanite a reputation for potentialities so vast as to stagger the imagination.

This discovery of cyanite will appease a world-wide market for this wonderful non-metallic substance, heretofore mined only in California, Chesterfield, Mass., the Saint Gothard region in Switzerland, and in India. All these

mines are capable of only a limited output. In fact, all of the cyanite heretofore found in the world has been small in volume, usually in nuggets upon the surface of the ground and in rock that assays so small a percentage of mineral as to make mining operations a doubtful venture. Nowhere else on the globe has cyanite been found in such vast quantities as in this North Carolina hillside—in such tonnage as to make this the only large commercial deposit known to mankind.

The best spark plugs are manufactured of aluminum silicate (cyanite) and sillimanite. Cyanite, silicate and sillimanite are practically one and the same, though cyanite is considered a little more superior because of its ability to withstand a greater amount of heat. The largest spark plug company in the world uses the entire output of the California sillimanite mines. In fact, it is said this cancern has what amounts almost to a monopoly on the spark plug business. It is believed that the discovery of cyanite in volume in North Carolina will revolutionize the manufacture of spark plugs.

A view of the mountain (X) of cyanite, and the field, a quarter of a mile wide and three-quarters of a mile long, where ten million tons of it lies on the surface in plain sight.

Certainly they can be made far superior by the us of pure cyanite, which has been demonstrated to be able to withstand a repeatedly extremely high heat.

The discovery of this deposit is also bringing to the forefront new fields in the manufacturing industries. Cyanite can be used to advantage in the ceramic industry, in the making of electrical porcelains, crucibles, glass pots and similar containers. Probably other uses will be found for it now that it may be obtained in practically unlimited quantities. Its rarity in the past has added no little to its value, and has restricted to a considerable extent the output of these industries that are forced to depend upon them.

Cyanite has been found in many parts of North Carolina and over the world at large, but always in small quantities—hardly more than samples, here and there. The small pockets and restricted mines have had to suffice the world up to this time. The tonnage of cyanite in the newly discovered deposit will run to about 35 or 40 per cent, but the mineral is said to be far superior to that found in any other part of the world, due to the fact that the rock in which it reposes is not so hard as with other cyanites, and that

it can be easily crushed for the purpose of obtaining the pure mineral. It is the tonnage that will be made possible by the North Carolina find that is proving of interest to the world.

Mountaineers relate that 30 years or more ago they picked up specimens of which it now develops was cyanite and sold them to dealers in curios at one cent per pound. They did not know what it was, and the dealers handled and disposed of the valuable stuff merely as unusual and curious specimens of rock.

The main vein of the deposit is only two miles from the state highway, one mile of which is already accessible by automobile. The location will be found to be ideal when mining operations are begun in earnest. With hard-surfaced roads traversing the mountain in every direction, and still others in course of construction, the matter of transportation will not be insurmountable. There is a railroad within striking distance of the property. It is not improbable that a spur track will be constructed to tap the mountain when the time comes.

Mr. J. A. Pollard, discoverer of the cyanite deposit, and controlling owner of the great mountain in which the mineral lies, has already received a number of offers for his mountain of cyanite, an especially attractive one coming

General view of the country where the cyanite deposit was discovered. The mountain with the open field showing is the storehouse of the mineral. The tiny cabin just below the field and to the right is where the cyanite rock begins to show. Straight above and on top of the mountain, is where the main diggings have been made. Due to bad weather and clouds Mount Mitchell, which towers high above the lesser peaks, does not show in the pictures.

from an internationally known German syndicate, who indicate that they will have to offer something new and of great importance, into the manufacture of which cyanite will enter—just what has not been disclosed. Representatives of the world's largest refractory companies have also sent representatives to survey the deposit and make offers for it. But Mr. Pollard has not seriously considered selling up to this time.

If extensive tests and experiments now being carried on by various experts throughout the country prove the commercial value of the enormous deposit, this mountain top will be worth its weight in gold.

It all depends on the finding of these experts as to the refractory power

of the material and the practicability of separating the pure from the impure cyanite at a reasonable cost. The experts have not reported, but enough has been learned from preliminary examinations to raise reasonably promising hopes that Yancy county might become the seat of a great mining industry.

The field in Yancy county has been extensively surveyed by Dr. J. L. Stuckey, former state geologist, and by H. J. Bryson, acting state geologist. Dr. Stuckey, who made the original survey, also made a report that contained complete scientific recital of the combination in which the cyanite is found.

The contents of the raw materials in which the cynaite it mixed, he reported, consists of mica schist, gneiss-hornblende schist and gneiss, garnet gneiss, cyanite schist and granitoid layers. In the particular area examined the mica and hornblende schist and gneisses, which contain cyanite, predominate. He described the cyanite as being scattered through the rocks in varying amounts from five to forty per cent and occurring in crystals four to eight inches long.

In addition to the general rock masses which contain small crystals of cyanite, there is a quartz vein which is apparently a part of a pegmatite intrusion near which there are large masses of cyanite in blended crystals four to eight inches long. The vein varies up to eight or ten feet in width.

One of the problems in the production of commercial quantities of cyanite, Dr. Stuckey's report explained, is the separation of the garnet from the cyanite, or the impure from the pure. Each have almost the same specific gravity. The cyanite will have to be crushed very fine to free the garnets found in the crystals.

Garnet and mica fuse readily and will tend to lower the refractory value of the cyanite if left with it as well as destroying the white color usually wanted in such articles as spark plugs. Not all cyanite has by any means proven satisfactory for refractory purposes, and this may have faults.

Dr. Stuckey's suggestion was that while the property is interesting it would be unwise to speculate on its value until thorough tests have been completed as to the concentration of cyanite and the way it reacts to heat after being concentrated.

Mr. Bryson, the present state geologist, who has been over the field in recent weeks was keenly interested in the potentalities of the material, but he preferred to wait on the tests before venturing an opinion as to its commercial value.

The finding of large crystals of pure cyanite tended to indicate that the matter of concentration of the mineral would not be unduly difficult. One of the major things to be determined, Mr. Bryson indicated, is the possibility of separating the garnet from the cyanite, since the pure cyanite is essential to refractory power. The department is awaiting on the outcome of the tests being made of the Yancy deposits. If they turn our all right a great industry will be the result.

"It would mean one of the greatest mining industries in America," Mr. Bryson declared enthusiastically.

No one could estimate the per ton value of cyanite in the event it should be found of commercial value. But material mined in the west and put to the same purposes for which cyanite might be used costs upwards of $40.00 a ton. At half that price, the tonnage in this great mountain would be worth a lot of money.

Damnant Quo Non Intelligunt

"The ordinary run of men live among phenomona of which they know nothing and care less. They see bodies fall to the earth, they hear sounds, they kindle fires, they see the heavens roll above them, but of the causes and inner working of the whole they are ignorant, and with their ignorance they are content."—From "Pioneers of Science," by Sir Oliver Lodge.

Two World-Famous Mineral Collections Donated to the Smithsonian Institute

By PETER ZODAC

Two of the largest, most complete private collections in the world, were recently donated to the Smithsonian Institute, at Washington, D. C.

Frederick A. Canfield of Ferre Monte, on Mine Hill, near Dover, N. J., who died in July 1926, was the donor of one collection, embracing about 9,000 specimens and accompanied by an endowment of $50,000 to be used for its increase.

Col. Washington A. Roebling, of Trenton, N. J., builder of the Brooklyn Bridge, who also died last July, was the donor of the other collection, embracing about 16,000 specimens and accompanied by an endowment of $150,000 to properly house and care for it.

The writer is personally acquainted with the Canfield collection as he many times had the pleasure of seeing and admiring its wonderful minerals, while engaged as Assistant Superintendent for a Mining Contractor of Dover, N. J., in 1920. Mr. Canfield's hospitality, and his pleasure in showing his collection, was known far and wide. Many availed themselves of the opportunity to see the mineral marvels to be found there. The collection was a very old one as many of its minerals were in the family for over 100 years. It was in two sections, these comprising about 1,000 specimens collected by Mr. Canfield's father, and displayed in up-right cases with glass doors. These doors never were opened from 1853 (evidently the year Mr. Canfield's father died) until their transfer to the Smithsonian Institute.

These minerals were found early in the history of this country in mines which have long since shut down. The minerals from them, consequently, no longer are available. As the elder Canfield had access to many mines, especially those of New Jersey, the specimens collected are among the finest in the world, and perhaps, may never be duplicated. The younger Mr. Canfield, who bore the same love for minerals his father had, began a collection of his own. This comprises the 2nd section. As he was a Mining Engineer and traveled all over the world, he accumulated a large assortment of many rare and choice minerals, often under trying conditions. One specimen, a meteorite, found in the interior of Brazil, I believe, and weighing about 15 pounds, he carried for hundreds of miles, over a wild and rough country, until he came to a town from which he could send it to America.

In the '80's Mr. Canfield was Superintendent of the Tilly Foster Iron Mines, near Brewster, N. Y. He obtained from there some of the finest specimens known—and Tilly Foster is famous for its wonderful minerals. Canfieldite, a silver-tin-germanium sulphide, was named for Mr. Canfield. It is a rare mineral, found chiefly in Bolivia.

The Roebling collection, comprising about 16,000 specimens, is among the finest private collections in the world. It is especially noted for its wonderful gems, many of which are the largest and rarest of their kind known. Among others, there is a large wine colored Topaz crystal from Brazil; a 310 carat Peridot from the Island of St. John in the Red sea, which according to legend, once adorned the image of a Saint; a 64 carat black Diamond from Africa; a black Opal from Nevada (the largest known); the largest known group of gemmy Tourmaline crystals in the world (from California; and many other exceptionally fine specimens.

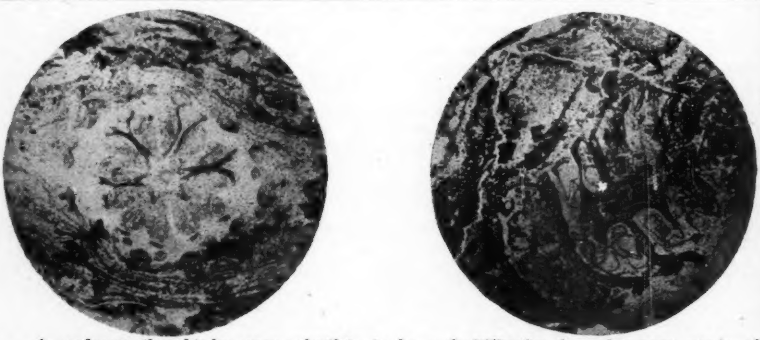
The value of these two collections is not known as yet, but with their acquisition the Smithsonian Institute now possesses, in addition to its already large collection, one of the finest, largest and most complete collections of minerals, crystals, and gems in the world.

Microscopic Rock Sections and Their Uses. A Fascinating Hobby.

By E. P. BOTTLEY, Derby, England

Modern scientific research owes much to the carefully finished, transparent sections of rocks, fossils, etc., that are prepared for use under the microscope by a few devotees who generally spend their life-time at this interesting art. The investigations into radio-activity, the study of ceramics, and refracteries, are dependent to a great extent upon the skilfully-prepared thin sections of materials necessary in forwarding these studies and industries. Apart from direct industrial applications geology, mineralogy and other sciences have been considerably enriched with information and knowledge gained by studying thin sections of rocks, minerals, fossils, etc.

Microscopic sections of rocks, minerals, fossils, etc., are about ½ by 1 inch in size. They are mounted on small glass slips, 1 x 3 inches, ground to a thickness which in nearly all cases renders the minerals beautifully transparent, and covered with a very thin glass cover less than 1/100th of an inch thick. They are then labelled and filed away.



A seed-cone thought by some scientists to be a fruitification born by some specie of Calamites. Coal Measures—Carboniferous) England. To the left: Transverse Section; to the right: Longitudinal Section.

To the mineral and fossil hunter, the collecting of microscopic rock sections can be recommended as an interesting and artistic way of storing in a small space a large collection. Further than this, with just a simple microscope, many enjoyable hours may be spent studying the stories of cooling rocks, or the inhabitants of lakes, seas, and lands that have long since disappeared.

To William Nicol (1768-1851) belongs the honor of devising a method of grinding down thin slices of petrified plants and studying same under the microscope. This process was further improved by his invention of the Nicol Prism. These prisms are made from Iceland Spar and to produce the affects wanted the Spar has to be cut in a special way. Light rays striking one of these prisms are stopped from traveling in all directions except one. As used, a thin section of a rock is placed between two of these Nicol prisms and while being observed thru one prism, the other one thru which light is passing to illuminate the section, is rotated. Beautiful so-called interference tints will be seen. The colors will vary with the direction in which the mineral is cut in many cases and the type of crystal structure that may be present. They will also vary in degree of intensity and in tint,

according to the thickness of the thin section. Sections usually show quartz as a pale yellow tint, and feldspars gray, when the nicol's are in the so-called crossed position. The apparatus in which these colors are being observed is known as a polariscope.

The study of fossilized plants under the microscope was carried out in much greater detail by Dr. W. C. Williamson of England (1816-95). Dr. Sorby, of Sheffield, England, during the latter half of the 19th Century carried out a similar study with rocks. Of course the methods at first used were very crude, laborious, and costly, but now it can be done so easily and cheaply that the study of rocks, minerals, fossils, etc., under the microscope has become quite a popular hobby with many amateurs in England.

Thin sections of fossils plants from the carboniferous rocks in England are perhaps the best known. They are prepared a little larger than the ordinary section, varying from 1 x 3 to 4 x 6 inches. They are very difficult to prepare as the materials that have to be ground down to transparency are often very soft, disintegrated, or otherwise fragile. Nevertheless, when finished by a skilful worker they are very beautiful and interesting. The majority of the so-called "structure material" from which sections of fossil plants are made, comes from nodules which occur, often in great numbers, in portions of the coal-seams of the lower coal-measures. These "coal-balls" are especially numerous in Lancashire and Yorkshire. Many are also found on the continent, as for example, in the Westphalian coal-field of Germany. They vary in size from a few inches up. Occasionally some are found that are 2 feet in diameter. In France the majority of the structure material is silicified, differing from the ones described above which are calcareous petrifactions.

Within recent years satisfactory methods have been discovered for obtaining thin sections of coal. The coal must first undergo a special hardening process before it can be used. Sections are usually prepared in about the same sizes as fossil plants. Plant sections, however, are about 1½ thousands of an inch thick, while coal sections are ground much thinner before it is possible for light to pass thru it. Sections of coal are not usually in much demand by amateurs but are by specialists. Since coal sections have been introduced a vast amount of information has been derived on coal formation.

As with coal, sections of industrial material are chiefly in demand by specialists, or by the refractory and ceramic industries. Sections of brick, china, etc., are the most important ones prepared. Little need be said of this type except that such sections are very difficult to prepare on account of the excessive thinness required in order that light may pass thru it.

It will be realized that a great many factors govern the preparation of thin sections, and no brief description would be correct for the methods that are used. Sufficient, however, has been said to introduce a new subject which can, in a convenient form, be utilized by the amateur as a fascinating study and method of collecting vestiges of earth evolution.

The Seventh Annual Meeting of The Mineralogical Society of America, was held at the University of Wisconsin, Madison, Wisc., Dec. 27-28th, 1926. Many members were present and some interesting papers presented. The following officers were elected for 1927:

Honorary President: Edward S. Dana, Yale University, New Haven, Conn.

President: Austin F. Rogers, Stanford University, California.

Vice-President: George L. English, Rochester, N. Y.

Secretary: Frank R. Van Horn, Case School of Applied Science, Cleveland, Ohio.

Treasurer: Alexander H. Phillips, Princeton University, Princeton, N. J.

Editor: Walter F. Hunt, University of Michigan, Ann Arbor, Mich.

Councilors: W. A. Tarr, University of Missouri, Columbia, Mo.; Alexander N. Winchell, University of Wisconsin, Madison, Wisc.; A. L. Parsons, University of Toronto, Toronto, Canada; William F. Foshag, U. S. National Museum, Washington, D. C.; Waldemar T. Schaller, U. S. Geological Survey, Washington, D. C.

The Bottomless Pit

BENJAMIN T. DIAMOND, B. S.

Heap bad land. The Indians probably said when they vacated the Bronx. To them is was inhabited by evil spirits who sucked down both man and beast. Young warriors would enjoy themselves by throwing stones into what was known to them as the "Black Pit," and watch the stones sink out of sight.

When the Paleface moved into the Bronx, he soon discovered that the "Black Pit" was to be avoided. Animals that wandered into the Pit were sucked down almost immediately. Because of its great capacity to absorb, it soon was known as "The Bottomless Pit."

Engineers studied this phenomenon of nature. Tons of rocks were thrown into the pit. At last, the day came when people could walk over the place where the Pit was, without fear. Soon after, a house was built on that place.

Two months ago the house began to sink. The idea of a "Bottomless Pit" was revived!

It a "Bottomless Pit" possible? What is the explanation of this remarkable phenomenon?

A careful study of the surrounding territory shows that the Pit is situated in a preglacial limestone valley. A valley means that a stream has occupied it at some time. With the coming of the glacier, a deposit of more than a hundred feet thick of glacial till was deposited.

These facts seem to point to a solution.

There is probably an underground stream (a relic of the ancient stream) under the glacial till, which washed away the rocks that filled the Pit. Also, water percolating into the limestone at this weak point made it weaker still by dissolving the calcium carbonate. The underground passages became enlarged by solution so that the limestone may contain a network of tunnels and caverns.

These two agents of erosion weaken the rock so much that with the aid of gravity, it caves in.

The rocks are constantly being eroded and washed away towards the sea. This gives the affect of a "Bottomless Pit."

Glossary Department

A list of various mining, mineralogical and geological terms, with explanation of each one. Free use has been made of various publications on mining, mineralogy, and geology, including bulletins by the U. S. Bureau of Mines and the U. S. Geological Survey. The Century, Standard and Webster dictionaries have also been consulted.

Aerify—To change into a gaseous form. To infuse or force air into; to combine with air.

Aerinite—A bright-blue earthy variety of Fahlunite.

Aerites—A synonym for Metallites.

Aerogene Gas—A gas produced by the system of carbureting air devised by Van Vriesland. Used in some sections of Holland for lighting both streets and houses.

Aerohydrous—Inclosing a liquid in the pores or cavities; said of some minerals.

Aerolite—A mass of metallic or other mineral substance which has fallen to the earth thru the air. The metallic aerolite consists principally of metallic iron, nickel, and chromium; the non-metallic aerolite consists of crystalline rocks resembling greenstones; others consist of mixtures of these. A meteorite.

Aerophere—A respirator in the form of a tank which receives the exhalations from the lungs and containing chemicals designed to revive the air, to render it fit for breathing. An apparatus (portable) containing a supply of compressed air for respiration, as for a miner.

Aerosiderite—A meteorite consisting chiefly of iron, generally nickeliferous, with particles of phosphide of iron, carbon, and hydrocarbons.

Aerosiderolite—A meteorite that is both metallic and stony.

Aerosite—Same as Pyrargyrite.

Aerosphere—The atmosphere considered as a spherical shell of gases surrounding the earth.

Aeruge—Copper rust; verdigris; especially, green copper coating adhering to old bronzes.

Aetite—A nodule consisting of a hard shell of hydrated oxide of iron, within which the yellow oxide becomes progressively softer toward the center, which is sometimes quite empty.

Affluent—A stream that flows into another; a tributary.

Afterdamp—The mixture of gases remaining in a mine after a mine fire or an explosion of fire damp. It consists of carbonic acid gas, water vapor (quickly condensed), nitrogen, oxygen, carbon monoxide, and in some cases free hydrogen, but usually consists principally of carbonic acid gas and nitrogen, and is therefore irrespirable. See also Black damp.

Aftergases—Gases produced by mine explosions or mine fires.

Agalite—Fibrous talc, pseudomorphous after enstatite.

Agalmatlite—Essentially a hydrous silicate of aluminum and potassimu, corresponding closely to Muscovite. A secondary or alteration product. See also Pinite. A soft waxy mineral used for carving by the Chinese. Also called Lardstone.

Agaphite—A conchoidal variety of Persian Turquoise.

Agaric Minerals—A soft, light, pulverulent hydrated silicate of magnesium found in Tuscany, from which floating bricks can be made. A light, chalky deposit of calcium carbonate, sometimes called Rock Milk, formed in caverns or fissures of limestone.

Agate—A variegated waxy quartz in which the colors are in bands, in clouds, or in distinct groups; also a gem or precious stone made from this mineral. A variegated chalcedony.

Agate Jasper—An agate consisting of jasper containing veinings of chalcedony.

Agate Opal—Agate like in structure, but consisting of opal of different shades of color. Same as Opal-Agate.

Agate ware—An enameled iron or steel ware used for household utensils. Pottery veined and mottled to resemble agate.

Agatized Wood—Wood changed or petrified into agate. See notes under Wood.

Age—Any great period of time in the history of the earth or the material universe marked by special phases of physical conditions or organic development; an eon; as the age of mamals. Called also Era. One of the minor subdivisions of geological time, a subdivision of the epoch corresponding to stage or formation; recommended by the International Geological Congress.

Agglomerate—A breccia composed largely or wholly of fragments of volcanic rocks. More specifically, a heterogeneous mixture of fragments of volcanic and other rocks filling the funnel or throat of an extinct or quiescent volcano. To wind or collect into a ball; hence to gather into a mass; to cluster.

Aggradation—In geology, the natural filling up of the bed of a watercourse by deposition of sediment. Specifically, the building up by streams in arid regions of fan-like graded plains, by reason of the shifting streams and the loss of the water in the dry soil. Contrasted with Degradation.

Aggradation plain—A plain formed by aggradation in arid districts. It begins by the building up of the hollowed bed of a stream, at the foot of a declivity, forming a plain with a nearly straight longitudinal profile, that may become a very broad plain of deposition.

Aggregate—To bring together; to collect or unite into a mass. Composed of a mixture of substances separable by mechanical means.

The mineral material, such as sand gravel, shells, slag, or broken stone, or combination thereof, with which cement or bituminous material is mixed to form a mortar or concrete. "Fine aggregate" may be considered as the

material that will pass thru a ¼ inch screen, and "coarse aggregate" as the material that will not pass thru a ¼ inch screen.

Aggregate polarization—The polarization displayed by extremely small grains of doubly refracting minerals.

Aggregate structure—A confused mass of separate little crystals, scales, or grains, all extinguished under the polarizing microscope at different times.

Agitation—In metallurgy, the act or state of being shaken, stirred, or moved with violence.

Mineral Collectors and Others

By C. W. HOADLEY

The mineral collections which I have seen may be classed in two general divisions. The scientific collection and the non-scientific collection.

In discussing the former, minerals are usually arranged according to Dana's system of mineralogy. However, if the collection is not too large, an arrangement according to localities is not alone admissable, but logical, as minerals from a prominent, well known locality usually occur in a matrix which is distinctive of the locality.

The minerals of Franklin, New Jersey, occur in either the typical metamorphosed limestone, or the granular Franklin ore.

The minerals of the Binn Valley (Binnenthal) Switzerland, are found in Dolomite or Gneiss with their typical associated species which make them distinctive to all old collectors.

It seems to the writer that inasmuch as the associated minerals of a specimen play such an important part in paragenesis the mineralogist should consider the matrix seriously in the arrangement of his collection, as its origin is closely associated with the geological formation in which minerals are found.

A collector should always strive to get his specimen showing a well developed group of crystals. Broken and battered crystals, no matter how rare, should be discarded.

After the specimen has been secured, it should be carefully labeled and verified. A mislabeled specimen should never be found in a mineral collection. It is better not to have any name or locality on a label than a doubtful or a misleading description.

In regard to labels, they should be printed on the best bond paper, not cardboard, as it is often necessary to fold the label to insert it in a tray, or to affix it to a vial. I have found that a label 2¼" x 1¼" is about the right size. If your specimens are to be contained in a chest of drawers, each specimen with its label should be placed in a tray, which should be lined with glazed paper, in order that dust shall not discolor them.

These trays should be made of cardboard in the following sizes:— 1½" x 2", 2" x 3", 3" x 4", 4" x 6". By this arrangement of sizes the trays will fit together into units of the larger size. The drawers of the cabinet should be not larger than 18" x 22" x 3" deep, inside measurements. It is also advisable that the drawers should be built to be as nearly dust proof as possible.

In one collection which I have recently seen a sheet of glass, which fits the drawers, is placed directly over the specimens, supported by a small molding fitted around the sides of the drawers.

As many species are affected by light and moisture it is most advisable to determine a practical means of preserving the specimen. If the collector has Proustite or Realgar it is absolutely necessary to keep such specimens from the light. Other species such as the salts should be preserved by placing them in airtight jars. This applies to most of the sulphates as well. Certain minerals like Laumontite, Lansfordite and Borax are destroyed by losing the water of crystalization. It is therefore advisable to understand the properties of your specimens in order that they may be preserved. A

simple means for preservation of the latter is to dip them in a thin solution of Collodion or lacquer.

Hanksite, as an example, should be waterproofed with vaseline, Laumontite should be either waterproofed or kept under water.

The salts and sulphates, on the other hand, being more or less deliquescent, should be sealed in air-tight jars in order to preserve them from absorbing the moisture from the atmosphere, particularly during the summer months. No sulphate or salts should ever be washed.

The size of a specimen should be determined by the crystals and their distribution on the matrix. Quality should be preferred rather than size. A small single crystal of ⅛" is lost on a large piece of rock.

The trimming of a mineral specimen should always be done with the utmost care, a small jeweler's hammer and a brad or punch used for this work, has proved to be successful in trimming and developing a crystal.

It is also advisable that the specimen should be numbered and the corresponding number written on the label to avoid the disastrous result which would occur if the labels were mislaid or lost.

I feel it only right to say a few words about the unscientific collection. In many cases the species are not labeled, or if they are a specimen might be marked as Beryl, Brazil, or Calcite, England. In many of these collections the owner is not a collector of minerals, as much as a gather of labels and species. He cares little about the locality of the specimen, or its correct name.

I have known a collector while visiting a dealer exclaim, "Oh, that is a new name to me, I must have that specimen," although it may be merely a local name of some well-known species which he may have in his collection. I have found that dealers are very apt to label their specimens with either a local name or a synonym for a comparatively common species. Fortunately these dealers do not stay long in business. When you buy your specimens get them from a dependable, reliable man, then study them before placing them in your collection.

Occasionally the collector is offered small loose crystals by the dealer, these may be kept in small vials or mounted on stands, made for the purpose. But I have known of unscrupulous dealers mounting or cementing a crystal in a matrix which is foreign to the species offered.

Recently I had occasion to examine a specimen labeled topaz, Thomas Mt., Utah, on the matrix were three crystals of topax and two were from Japan, one from Thomas Mt., but all three were cemented in place.

On another occasion, in looking through the stock of a dealer, I found two specimens, both black crystallized tourmaline, which had originally been one specimen, broken in half by the dealer to sell as two. One half was labeled tourmaline, Acworth, N. H., the other half was labeled Pierrepont, N. Y. Both were from Haddam, Connecticut.

I have seen specimens of tourmaline, cemented in the gangue, which projected like quills on a porcupine and I have seen emerald crystals from the Ural Mts. affixed to a piece of New York building stone.

In this article I have touched on the principals of mineral collecting. If your specimen is correctly labeled, giving the name of the species, the nearest village from the locality, the county and state or country, in other words as full a description as possible, your specimen will be of more interest than if it is carelessly labeled, with a meager description of the locality.

Mr. and Mrs. W. D. Nevel, of Andover, Maine, are touring the country, by auto. Last heard from they were in San Diego, Calif. Beyond doubt, Mr. Nevel, who is a mineral dealer, is taking advantage of all opportunities to visit and examine interesting mineral localities along the way. We extend to Mr. and Mrs. Nevel our best wishes for an interesting and prosperous trip and trust they may come back "loaded down" with choice minerals.

THE BEGINNER'S CABINET

A DEPARTMENT FOR YOUNG COLLECTORS

Conducted by
ILSIEN NATHALIE GAYLORD.

WHAT TO COLLECT AND WHERE TO FIND IT

"What shall I collect first? Where shall I find specimens?" is the eager inquiry of many a young nature student who would like to begin a mineral collection. The answer is simple. Begin with that little stone that you pushed aside, there on the sidewalk. It rolled down from that pile of cracked rock, where they are mending the street. Uninteresting, do you say? On the contrary, that little granite stone has been through the most terrific experiences. And at the very least, it is a million years old. What a story it has to tell!

Once it was far down in the depths of the earth. The heat there was terrific. Even the hardest rocks were melted. And tremendous movements were going on. Then at last by mighty upheavals and pressure, great mountains were formed. In the heart of them was this little stone. Not in the form it is now. Then it was a part of the great granite core of the mountains.

There it stayed for many long ages. But gradually the wind and rain and ice wore down the outer part of the mountains. At last a granite ledge was laid bare. Then came the quarrymen to break it into bits for the roadbed. And that is how this little piece of granite came to be lying here in the path. Even yet its story is not all told. But we must leave the rest of it for another time. Would you have believed that such a common little stone could have been through such a thrilling experience? We must surely pick it up and keep it for the first specimen in our cabinet.

Plenty of other interesting specimens we will find, too, all around us. Look at this old stone fence over here, going to ruin. These blocks with pebbles embedded in them are called "pudding stones." A great mountain of ice, a thousand feet thick, made that rock pudding. Here are some pieces of it, that we may have for our collection. Their history is as wonderful as that of the little granite fragment. When our walk is over, we will hear the pudding stone's strange history.

In that stone quarry over on the hill, as the great rocks are dug out, beautiful crystals come to light. And along the creek, many a pebble, when it is broken open, shows a hollow heart full of tiny bright crystals. Even that pebble with the deep scratches on it, has as strange a history as the little granite fragment and the pudding stone. As for the rock ledge up there on the hill side, it is a treasure chest of specimens. A geologist's hammer and a cold chisel are the keys which will unlock it for us.

Really, everywhere we go there is something to be found. So let us begin our collection with whatever is nearest us. Then as we learn more and more of this wonderful earth of ours, we can add larger and rarer specimens. Of course, there are far-away places which have interesting specimens too. But those we can purchase for a few cents from some dealer in minerals. Collecting in these ways, we will soon have a cabinet full of interesting and beautiful specimens.

OUR FIRST SPECIMEN: GRANITE

This earth of ours is, after all, only a great bubble of rock-matter. Millions of years ago, vast forces set this big earth bubble whirling and floating through space. Upon its hard crust we are riding, on a journey which goes—no one knows where!

But instead of being hollow, this earth bubble is filled with intensely heated rock matter. Only about fifty miles thick is the crust over it, upon which we are riding. So it is small wonder that from time to time this thin crust is cracked open by great forces pressing against it. And that up through these cracks and weakened places, pushes the melted rock matter from within.

What has all this to do with our little granite fragment? Just this: that the very first hot rock matter which ever pushed up through the earth's crust was granite. That was millions of years ago. Not that our little fragment may have come up at that time. It probably came up at some later date. But it belongs to that kind of rock, the very oldest in the world.

So we will honor it, this small bit of granite, by making it the first specimen on the shelf which we will keep for the rocks. It is worthy of honor, not only because it is so very old, but also as a type of the strongest and most enduring of all earth's great family of rocks.

FLOWERS OF THE ROCKS: CRYSTALS

As the garden has its bright flowers, so the rocks have their flowers too. To be sure, these "rock flowers" are glassy and hard, and we call them crystals. But in color they are as gay as any blossom in the garden. They spring from the rough dark rocks, just as the real flowers spring from the rough dark earth. Only these rock flowers never come up to the sunlight and air, as the garden flowers do. Hidden away they are, in pockets of rock and earth. So that is where we must search for them.

Because they are so hidden away, no one knows just where a beautiful crystal will be found. For that reason we have to search wherever there are rocks, especially crumbling ones. Perhaps that rock ledge sticking up there in the old pasture, hides some pretty quartz crystals. There are almost sure to be some down in the granite quarry. And over there where the limestone rocks are crumbling away is a good place to look for little red garnets, and perhaps for other crystals too.

Very thoroughly we must search around the broken rock. As the weather crumbles it, often its hidden crystals are loosened and sink into the soil. But more often we will find the crystals still fastened to the rock. Then we must work very carefully indeed. It will not do at all to try to knock them off. These rock flowers are as fragile as glass. A sudden blow or jar will crack them into pieces. We will need to chip and dig away the rock several inches from around them, until we can carefully lift them out.

It is exciting work, this hunting for buried rock treasure. Besides the crystals for which we are searching, we will find all sorts of other curious stones. Perhaps one will be a piece of dark rock with a white band running through it. Or it may be a pebble that is worn down as flat as a penny. Whatever it is, you may be sure that it has an interesting history.

There is no knowing what you might discover. It was a young boy who discovered one of the finest jewel mines in New England. One day he picked up some interesting looking stones. These stones were gems, and there was a whole mine full of them just under the earth nearby. And it was some little South African children who were playing with a bright pebble, which led to the discovery of the great diamond mines in Africa. That bright pebble was a diamond. To be sure, some people believe that all the real treasures have now been found. But after all, no one really knows what may yet lie hidden away in the dark rocks.

How these beautiful crystals grow from the hard rough rocks, is a wonderful story. It begins far down in the earth, with the melted rock matter there. This rock matter is made of many kinds of minerals, a sort of hot rock pudding. Our little granite fragment has at least three different minerals in it, quartz and feldspar and mica.

When this hot rock matter is pushed up through the earth's crust, it begins to cool. If it cools slowly, the minerals in it form themselves into beautiful crystals. Each mineral has its own especial shape for its crystals, just as each plant has its own blossoms. And becaue there are many kinds of minerals, there are many kinds of crystals of all colors and shapes. To see a cabinet full of them is like looking at a bright garden full of flowers. There are rich red garnets, violet amethysts, blue sapphires and many other colors among these lovely rock flowers, which will not wither and fade as do the flowers of the garden.

In other ways, too, the crystals are like the garden flowers. Just as a rose or a sweet pea may have differently colored blossoms, some of the minerals have crystals of different colors. There is quartz, for instance. It is the main mineral in granite. If quartz is pure, its crystals are clear as glass. But sometimes a bit a some other mineral will seep into the fluid quartz while it is crystallizing. That gives the crystal a color. So we find beautiful violet colored crystals of quartz also. Or they may be rosy pink, or smoky brown. It all depends upon what other mineral mixed itself with the quartz.

Just as we know the common flowers of the fields and garden, so a mineral collector learns to recognize these various crystal flowers of the rocks. Quartz is the main mineral in our little granite fragment, and the most abundant one in the world. So suppose we begin our study with quartz, and learn its many different colors and forms.

HOW TO KNOW A QUARTZ CRYSTAL

The first thing that we will learn about a quartz crystal is its shape. When quartz is pure, it hardens into a six-sided prism, with a six-sided pyramid top and bottom. But very often there is not room enough in the rocks for the quartz to form a perfect crystal. Other minerals may be there too, trying to form their crystals. Then each presses against the other, and none of them can grow into their perfect shape.

Sometimes one crystal will be as long and thin as a match. Another may be so short and chunky, there is scarcely any prism body left. It is all pyramid top and bottom. Or one long crystal will have quantities of tiny crystals growing all over it. Often the crystals grow in a clustered group, big and medium and small ones all together, like a whole family crowded close.

But since they have so many shapes, how can we always recognize a quartz crystal? The books about minerals explain a long sure way to do it. But there are three simple ways which will help us very well. One way is by the lines which run across a quartz crystal Sometimes, however, they are rather faint, and we must look closely to see them. Another way is by the rounded shell-shaped chips where a crystal is broken. Some crystals break into long thin sheets, but quartz cracks with these rounded chips.

The third way to recognize a quartz crystal is by scratching a piece of window glass with it. Minerals are of different hardness, and so they have been graded from talc which is the softest, up to diamonds which are the hardest. Your finger nail will scratch talc, so it is number one. Gypsum comes next, as number two. It takes a penny to scratch a calcite crystal, so it is number three. Flourite is four. Your knife blade will scratch a piece of apatite, number five. Window glass will scratch feldspar, number six. But it will not scratch quartz, number seven. It takes a steel file to do that. Then comes topaz, number eight, and corundum which is number nine. Last is a diamond, number ten.

Now suppose you are out collecting, and you find a clear crystal. And that neither a penny nor your knife blade will scratch it. Then you can be fairly sure that it is a quartz crystal. That is, if it shows round shell-like chipped places where it is broken. And if it is six-sided, and has lines across the crystal. Perhaps you will find other crystals close beside the quartz one, which look very much like it. But some of these three signs will be missing from them.

There are great giants and little pygmies too, among the crystals. Some are so tiny that they look like shining dust, until we see them through a microscope. But tiny as they are, each one is absolutely perfect, with its minute pyramid top and bottom. The largest one ever found was twenty-five feet around. Some are so sparkling, they are used like diamonds in jewelry. Others are made into balls, clear as water, which fortune tellers use. Some of these balls cost thousands of dollars. And beautiful cups and vases have been made of especially large clear crystals, for emperors and kings. The ancient cavemen treasured these beautiful crystals, just as we do today. We

find the crystals among their weapons in the caves, and in the graves of our own American Indians. But they believed that the crystals were icicles, frozen too hard ever to melt again.

ROSE QUARTZ, GOLD QUARTZ, AND A GEM

Many minerals do not get along at all well with their neighbors. There are violent fizzings and frothings and explosions whenever they meet. But quartz is a friendly mineral. Many a foreign substance it allows to mix quietly with itself, and color its crystals. The violet amethysts in our rings are really only quartz crystals. In many places over the United States you will find these lovely purple crystals. If they should not be perfect enough for gems, still they will make beautiful specimens for your cabinet. And dealers and collectors will pay good prices for really fine specimens.

In olden days people believed that gems could harm or help whoever wore them. The amethyst, they said, would give peace to its wearer. They believe, too, that each month had its own especial gem, which would bring great good fortune to anyone born in that month. The amethyst belonged to February. Even now many people wear their birth-month gem, as a pretty custom from olden times. In one of our big museums is a beautiful necklace of carved amethysts. It once belonged to an Egyptian princess, who lived many centuries ago. It was her birth-month jewel, and she wore it to protect her from danger.

Smoky quartz crystals you will find also. Radium, which gives us the X-rays, made the smoky color in those crystals. It will change the color of other crystals too, whenever it happens to be near them. There are quantities of smoky quartz crystals found in Scotland, and the Scotch use them for their national gem on their Scotch plaid costumes. Cairn gorms, they call them. As for curious quartz crystals, there is no end to them. They will make facinating specimens for your cabinet.

One kind which is found now and then, still has a little liquid left inside of the crystal. And in the liquid is a bubble which goes bobbing about, whenever the crystal is moved. Others have tiny crystals inside of a large one, like small prisoners in a crystal jail. Others with minute bits of shiny mineral scattered through them, are sparkling beauties. Then there are the frauds—pseudomorphs, they are called. When some crystal is dissolved out of its place in the rocks, quartz flows in and forms its crystal. But since that hole was the only space left, the quartz will ever afterwards wear the shape of that other crystal—a sort of wolf in sheep's clothing.

But quartz does not always form into full sized crystals. There is the beautiful Rose quartz, for instance. It cooled so quickly that its crystals were soon checked, and that left it a glassy mass of pink rock. Most of this bright pink rock is found in the Bad Lands of North Dakota. But you will find it in other places too. A piece of this rosy quartz will make a fine bit of color in your cabinet.

Milky quartz, too, is usually in a crystalline mass like the rose quartz. You will often find it in white bands through the rocks, where they were once cracked. The fluid quartz ran into these cracks and crystallized there. Generally there are pockets of beautiful crystals in these bands. If possible, break open the rocks that you find with the white quartz "ribbon" running through them.

Sometimes a large milky quartz crystal will have quantities of tiny white crystals all over it, like a snowy frosting. This milky white rock makes a good contrast for the rose quartz in the cabinet. It is in this white quartz rock that much of the gold in the west is discovered. Gold quartz, the miners call it.

SOME CURIOUS PEBBLES

Who would believe that pebbles were interesting specimens? But they are. Many a collector will show you a dozen of the most amazing kinds. One is sure to be a Geode. On the outside it will look like a rough rounded stone.

But cracked open, it shows its hollow heart lined with sparkling quartz crystals, like a little frosty cave. Sometimes you will find these geodes lined with amethyst crystals, or crystals of a beautiful blue mineral. Exquisite little specimens are these geode pebbles.

Once they were rock pockets, filled with liquid quartz or some other mineral, which finally crystallized. As the rocks decay, these shiny-hearted geodes loosen and fall into the soil. So it is there that you must look for them. Perhaps that crumbling boulder down in the meadow may be hiding one. A great glacier dropped that boulder there ages ago. It will pay you well to carefully crack open any unusual looking pebble that you find. Some of these small geodes rattle when you shake them—real rattle boxes made in nature's own workshop.

Other interesting pebbles you must look for in the gravel along the shores of streams and lakes. They are Moss Agates, and they look as though tiny bits of moss were caught in them. But it is never real moss. It is a dark mineral which crystallizes in that shape. It is hard to believe that it is not true moss.

Then there are bright blood-red Carnelian pebbles to be hunted for in the gravel, too, and clear honey colored ones. They are chalcedony, which is a form of quartz. And many of the agates have bands of color, where different minerals in them have crystallized. Putting these gay pebbles into water, brings out their colors wonderfully.

Now about arranging the specimens in a cabinet. Collectors are quite particular about how their collection is arranged. First, each specimen should be labeled with its name, and where it was found. If there is space enough, the label can be glued to the bottom of the specimen. Otherwise the specimen can be placed on a labeled card. The rocks can be kept on one shelf. And each mineral in all its forms can have a space to itself.

Our quartz specimens will need half a shelf or more, there are so many of them. The pebbles can go there too, for they are a form of quartz. As you study, you will soon learn into which group to place each new specimen that you find. If you have sharp eyes for spying out specimens, and if you keep them nicely arranged, your cabinet will soon be one of the most interesting places in the neighborhood.

Some Rare Minerals from Nevada

By H. G. CLINTON, E. M.

The only known deposit of Barrandite in America, is that occurring near Manhattan, Nye County, Nevada. Here it is found associated with a number of other rare and interesting minerals as Variscite (Utahlite), Vashegyite, Dahllite, Jarosite, etc.

Barrandite is hydrous aluminum-iron phosphate—(Al, Fe)PO4+2H2O. It is found in spheroidal concretions, indistinctly radiated fibrous, with the surface crystalline angular; concentric in structure. Also massive. H=4.5. G=2.576. Luster between vitreous and greasy. Color pale bluish, reddish, greenish, yellowish gray olive, and golden brown. Translucent to opaque.

Prop.—Yields water in a closed tube with an acid reaction. B.B. splits open and becomes darker in color; moistened with sulphuric acid colors the flame bluish green. Soluble in hot hydrochloric acid.

Localities. Original locality was near Pribram, Bohemia (long since exhausted), where it occurred in small globules, ½ to 1½ mm. in diameter, in sandstone with Cacoxenite and Stilpnosiderite. At Manhattan, Nev., it is found in a small prospect, as a little vein cutting a 12 in. quartz vein, but the

quartz above the Barrandite vein is heavily impregnated with yellow Barrandite. At one place the Barrandite vein butts against the main vein, in the prospect, which is Variscite (Utahlite). The colors of the Barrandite found here are olive, Isabella (Ridgeway)-a shade of brown, yellow, reddish, greenish, and golden brown. It is found only in a massive form. For further notes on this mineral, see the October, 1923 number of "The American Mineralogist" where it was described by Earl V. Shannon of the U. S. National Museum.

Variscite is a hydrous variety of aluminum phosphate—$AlPO4+2H2O$. It crystallizes in the Orthorhombic system, in prismatic crystals, usually six-sided, but rarely distinct. Commonly in sheaf-like aggregates and incrustations with reniform surface. Also massive. $H=4$. Luster vitreous, brilliant. Color deep emerald-green, bluish-green, to colorless. Transparent to translucent.

Prop.—Yields water in a closed tube. B. B. infusible but turns white. With soda fuses with a slight effervescence, moistened with cobalt nitrate solution becomes blue.

Localities—Original locality was in Variscia, Saxon Voigtland, from where it obtained its name. Here it is found in quartz and siliceous slate. In the U. S. it is found in beautiful specimens in Montgomery County, Ark., on quartz. In Utah it is found in massive, nodular and cryto-crystalline varieties, especially at Cedar Valley, Tooele County, with Wardite. These varieties are called Utahlite. At Manhattan, Nev., the Utahlite, of a green-white (often with blotches and streaks of yellow or purple), is found in a small vein, from 1 to 3 inches thick. Near the east end of this vein, the Variscite disappeared, and in its place a new mineral, Vashegyite, made its appearance. Variscite is much used as a gem or for ornaments, as it takes a beautiful polish.

Vashegyite is $4Al2O3.3P2O5+30H2O$. Massive, compact. $H=2\text{-}3$. $G=1.964$. Luster dull, opaque. Color white or yellow to rust-brown when colored by iron oxide. Sticks to the tongue.

Prop.—Infusible in a bunsen burner flame. Easily soluble in acids.

Localities. The original locality was Vashegy (from which it obtained its name) in Comitat Gomer, Hungary, where it was found in an iron mine associated with Limonite, Variscite, etc. As this locality has long since been exhausted, the Manhattan, Nev. deposit, is the only one now in existence. The first Vashegyite found at Manhattan was associated with green Opal, a few feet below this the Opal changed into a brown color, a little further on it changed again, this time to blue Opal. Tho these Opals make very attractive specimens, they are not of gem quality.

Dahllite is $2Ca3P2O8.CaCO3.\frac{1}{2}H2O$. It is found in crusts with a fibrous structure normal to the surface; also as radiating tufts. $H=5$. $G=3.053$. Luster resinous. Color pale yellowish white, white; colorless in thin sections.

Prop.—Descrepitates B. B., but does not fuse. Dissolve in cold dilute acids with evolution of carbon dioxide.

Localities—Original locality was Odegaard, Bamle, Norway, where it occured as a crust from 6 to 8mm. in thickness, upon a bright red massive Apatite. At Manhattan, Nev., it occurs in some vug holes in Barrandite, as white radiating tufts. Named after two brothers, Dr. Tellef Dahll and Johann Dahll, mineralogist and geologists.

The minerals found so far in this prospect are Barrandite (various colors); Utahlite; Vashegyite; Dahllite; Quartz; Green, Brown and Blue Opal; and Jarosite. The chances are good that other rare or interesting minerals may show up as the prospect is further developed.

The longest railroad tunnel in America, the Moffat Tunnel, through the Continental Divide in Colorado, will be officially opened for service on July 1st, 1927. This tunnel is 6½ miles long, 24 feet high and 16 feet wide. It will save 175 miles of travel betweent Denver and Salt Lake City. (Eng. and Mining Journal.)

Localities Department

Under this heading we shall be glad to publish clippings, notes, news, or items, on mineral localities and minerals found there. Please give as much information as possible.

Fine Jasper, in pebble-form, ranging in size from ¾ to 2 x 2 inches, has been found on the south shore of Bear Lake, 3 miles south of Manawa, Wisc. The color varies from lemon-yellow to orange-red and light-brown. The pebbles are not very plentiful and are found mostly buried in the sand. A limited number may be had from Rev. R. A. Karpinsky, Manawa, Wisc., in exchange for other minerals.

At Jamestown, Colo., a mining camp located a few miles northwest of Boulder, some interesting specimens of fluorite are found. The forms are from earthy (crumbly) massive to crystalline, though a few small crystallized specimens were also found. It comes in a wide range of colors from colorless to gray, brown, yellow, red, green and purple. The red phosphorescent variety (Chlorophane) and the dark-purple impure variety (Gunnisonite), are also found. The Fluorite forms the gangue of the lead ore. Other interesting minerals from this camp are: Galena (massive), Pyrite (massive and in cubes), Hematite (grayish-black and scaly), Chalcopyrite (massive), and Bornite (massive). Collectors can obtain some of these minerals in exchange for others by writing Byron Teagarder, 2205 Arapahoe Ave., Boulder, Colo.